BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of The original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
Please do not report the images to the
Image Problem Mailbox.**

(51) Int. Cl. 2 B60 B 1/08
B 60 R 1/02

(19) FEDERAL REPUBLIC OF GERMANY
GERMAN PATENT OFFICE

DT 25 37 876 A1

(11) Published Patent Application 25 37 876

(21) File reference: P 25 37 876.1–21
(22) Application Date: 26 August 1975
(43) Publication Date: 3 March 1977

(30) Union Priority: —

---

(54) Title: Rear-view Mirror Arrangement for Vehicles, particularly Motor Vehicles

(71) Applicant: Reitter & Schefenacker KG, 7300 Esslingen

(72) Inventor(s): BOTHE, Erich, 7300 Esslingen

Examination has been applied for pursuant to § 28b of the [German] Patents Act.

Translation from German

2537876

Walter Jackisch, B.Eng.
Patent Attorney
Stuttgart

Reitter & Schefenacker KG
Kreuzstrasse 55-59
7300 Esslingen

A 34 879

25 Aug. 1975

Rear-view Mirror Arrangement for Vehicles, Particularly Motor Vehicles

The invention relates to a rear-view-mirror arrangement for vehicles, of the type described in the generic part of claim 1.

Angle-mirrors for motor vehicles, in which the reflecting-surface of the rear-view mirror is divided into two mirrors at an angle to each other, are known in the art, their purpose being to prevent blind angles when viewing the roadway to the rear in the rear vision mirror. These known angle-mirrors have the disadvantage, however, that the reflecting-surfaces are not adjustable from inside the vehicle. Also, with these angle-mirrors, the rear view angles partly overlap, which confuses the driver with double images. Moreover, it is not possible, with an angle-mirror, to view the right-hand side of a [lefthand-drive] vehicle directly.

As an improvement on the above-mentioned inadequate arrangement, it is already known in the art that two mirrors can be mounted on the right-hand side of a motor vehicle, with the second mirror being arranged so that only a certain region on the right-hand side of the motor

vehicle can be viewed with it. In the case of buses, this region is mainly the entrance door, whereas with motor trucks, it is the wheels on the right-hand side of the vehicle. The main mirror of such a mirror arrangement must, by law, enable the viewing of a certain region of the roadway to the rear. However, when the auxiliary mirror of the mirror arrangement is firmly set to a certain region of the right-hand lane, particularly to the above-mentioned regions, there is still a very large blind angle.

Also known in the art are rear view mirrors, for motor vehicles, that are operated by means of a Bowden cable. Although the driver can indeed view a wide region of the right-hand lane with such a rear-view mirror, he is nevertheless still forced to continually adjust it to the sector of the right lane that is to be viewed. Making such adjustments is, however, hardly conducive to traffic safety, because during the adjusting of the rear-view mirror, it must be expected that a critical sector of the right-hand lane may be unviewable for some seconds or minutes. Even at a low vehicle speed of 50 km/h, such adjustment leads to a blind angle in the region of the legally-required rear-view safety zone over a stretch of road of at least 100 m. Moreover, such rear-view mirrors are very difficult to fit, because of the length of Bowden cable that has to be installed, which entails high costs.

The objective of the invention is to create a rear-view mirror arrangement, of the type mentioned initially, with which all regions of the right-hand side of the vehicle can be viewed at the same time without a blind angle.

This aim is achieved by the invention through the characterizing features of claim 1.

The characterizing features of advantageous embodiments and further-developments of the rear-view mirror arrangement of claim 1 are given in claims 2 to 13.

In the rear-view mirror arrangement according to the invention, there is a fixed main mirror satisfying the legal requirements, and an auxiliary mirror, adjustable from inside the vehicle by means of an adjusting device, whereby the regions of the right-hand lane not viewable with the main mirror – and therefore critical – can be viewed without the main mirror having to be adjusted. As a result, the driver is never distracted from the main rear-view region of the roadway – not even in critical phases of driving. Distraction is further avoided in that, with the rear-view mirror arrangement of the invention, no double images can occur, i.e. an object perceived to the rear will not be visible in both mirrors of the rear-view mirror arrangement at the same time. Thus errors by the driver, due to confusion arising from double images, are excluded with certainty.

The further details and benefits of the invention will now be explained through the example illustrated in the drawings, in which:

Fig. 1 is a cross-section through a rear-view mirror arrangement according to the invention;

Fig. 2 shows the rear-view mirror arrangement in Fig. 1, but viewed from the front;

Fig. 3 shows the rear-view mirror arrangement in Fig. 1, viewed from the rear;

Figs. 4-7 are diagrammatic representations of the fields of vision with rear-view-mirror arrangements known in the art; and

Fig. 8 is a diagrammatic representation of the fields of vision with the rear-view mirror arrangement of Fig. 1.

The rear-view mirror arrangement 1 according to the invention, shown in Fig. 1, has a nonrotatably-mounted main mirror 2 and, arranged thereunder, a considerably smaller, pivotally-mounted auxiliary mirror 3. The main mirror 2 and the auxiliary mirror 3 are mounted in a common mirror-housing 4, which consists of an outer housing-shell 5 and an inner housing-shell 6. The housing shells 5, 6 are connected to each other at their outer edges 7, 8 in a suitable manner. They can be so connected by welding, adhesive bonding, or by one being snapped into the other. In the region between the outer edges, the shells 5, 6 run at a distance from each other, and the hollow space so formed between the shells 5, 6 is filled with a filling-material 9, preferably an expandable plastic, e.g. polyurethane. Preferably the shells 5, 6 are also made of a plastic material, with the result that the mirror-housing 4 is in the form of a sandwich structure having very high mechanical strength and great durability.

The main mirror 2 is fastened in a suitable manner to the outer surface of the inner housing-shell 6 (i.e. the surface thereof facing away from the filling-material 9), whose contour is adapted to the shape of the main mirror 2. If the main mirror 2 is convex, as in the case shown, then accordingly the region of the inner housing-shell 6 adjacent to the main mirror 2 is also convex. For fastening the main mirror 2 to the inner housing-shell 6, the main mirror's rear surface, adjacent to the inner housing-shell 6, can be coated with an adhesive film having adhesive on both sides.

In the surface-region of the inner shell 6 adjacent to the auxiliary mirror 3, the inner shell 6 is shaped as a trough-like recess, with the transition region, between the surface-region of the inner shell adjacent to the main mirror 2 on the one hand and the recess 11 on the other hand, being formed by an essentially horizontal transverse-rib 10 (Figs. 1 & 2). The lower boundary of the recess 11, i.e. the border thereof opposite the transverse rib 10, is formed by the outer edge 8 there. The auxiliary mirror 3 is mounted inside the recess 11, on a positioning-mechanism 12. The electrically driven adjusting unit in the mechanism-housing 13 contains two electric motors and is mounted in the region between the back 14 of the recess 11 and the part 15 of the outer housing-shell 5 opposite said back 14; and in particular has filling-material 9 cast around it. This provides secure, non-shock-susceptible mounting of the adjusting unit, including the positioning-mechanism 12. The actuating motors in the mechanism housing 13 are supplied with electric power through a connecting-cable 16 running out from the interior of the vehicle through a grommet 17 inserted in the outer shell 5, and from there, in the space between the shells 5, 6, to the electric motors in the housing 13. Through the sending of suitable signals along the connecting-cable 16 to these actuating-motors, the auxiliary mirror 3 can be swivelled steplessly in two different planes within a given angular region.

The outer housing-shell 5 has in its centre a more or less circular-cylindrical raised region 18, a "dome" so to speak, on whose vertical surface the mounting-plate 20 of a ball-and-socket joint 19 is attached. The rod 22 connected to the ball 21 of the ball-and-socket joint 19 can be provided, on its free end, in a manner not illustrated, with a mounting clamp for holding the rear-view mirror arrangement 1 on a mounting rod on the vehicle.

Running right round the outer edges 7, 8 of the shells 5, 6, there is an impact protection frame 23, preferably made of a soft, elastic material such as rubber, which protects the rear-view mirror arrangement 1 from impacts. The shape of the impact protection frame 23 is clearly recognizable in the front view of the rear-view mirror arrangement 1. As is also shown in Fig. 2, the housing 4 of the rear-view mirror arrangement 1 is essentially rectangular with outward-curved lateral edges. The rear-view mirror arrangement 1 is fastened to the vehicle in such a way that the longer edge of the housing is oriented essentially vertically. Similarly to the mirror-housing 4, the mirrors 2, 3 are also essentially rectangular with outward-curved edges.

As can be clearly recognized from the rear view of the rear-view mirror arrangement 1 (Fig. 3), longitudinal ribs 24, 25 formed on the outer shell 5 run parallel to the vertical lateral edges of the outer shell 5 till said ribs 24, 25 reach a shoulder 26. As can be seen clearly in Fig. 1, the height of the ribs 24, 25 constantly increases from the upper edge of the housing 4 to the shoulder 26 and therefore, in addition to their function of reinforcing the mirror-housing 4, the ribs 24, 25 also take on a dirt-repelling function: the described arrangement of the ribs 24, 25 ensures that water or dirt striking the rear of the rear-view mirror arrangement 1 is diverted downward toward the shoulder 26, because most of the surface area of the mirror arrangement 1 lies deeper than the two protruding longitudinal ribs 24, 25. The running-off of the water or dirt occurs due to the gravitational force of the drops of water or particles of dirt, in combination with the effect of the flow of wind hitting the mirror arrangement 1. The fact that the water or dirt runs off vertically eliminates the risk that the water or dirt might get onto the mirrors 2, 3 and dirty them, by getting around the longitudinal

edges of the mirror arrangement 1, at right angles to their longitudinal (heightwise) direction, through the effect of the windflow. In addition, the fact that the height of the ribs 24, 25 increases from top to bottom ensures that rain water collecting more intensively in the region of the shoulder 26 runs off vertically in the desired manner and does not get round the side, onto the mirrors 2, 3.

Apart from supporting the main mirror 2, the transverse rib 10 also forms an optical transition between the visual field of the main mirror 2 and the visual field of the auxiliary mirror 3. If the image of an object being observed passes from the main mirror 2 to the smaller, auxiliary mirror 3, the driver of the motor vehicle can continue to follow the object without a break, the only difference being that the image in the auxiliary mirror 3 is smaller than the image in the main mirror 2 was.

To illustrate the technical progress achieved by the rear-view mirror arrangement according to the invention, the visual fields with various state-of-the-art mirrors mounted on the right-hand side of a [left-hand-drive] vehicle will now be considered, with reference to Figs. 4 to 7.

Fig. 4 shows a plan view of a vehicle 31 moving in the direction indicated by arrow 32, with an angle-mirror 33 provided on the right-hand side of the vehicle. Above the plan-view drawing – in the plane of the drawing – the angle-mirror 33 is shown, drawn in vertically (i.e. viewed in the heightwise direction), on point 34 of the vehicle 31, and its height above the road [labelled *Höhe über Fahrbahn* in drawings 4 to 8] is shown. The width and height dimensions of the angle-mirror 33 are marked "b" and "h" respectively. At point 35 inside the vehicle 31, the eyes of the driver are shown, from which a line of sight 36 goes out to the angle-mirror 33. As a result of the angled

design of the mirror 33, the driver sees, with the *left-hand* part 33a of the angle-mirror 33, the outer visual field 37 marked with dots and dashes, whereas with the other, angled part of the mirror 33b, he sees visual field 38, bounded by broken lines ("left-hand" here is relative to the vehicle's direction of travel). The visual fields 37 and 38 overlap each other in a zone 39, in which, due to the overlapping, a double image arises. Fig. 4 also shows the cross-hatched visual field 40, which represents the legally required visual field for the right-hand side with a distance "a" of 4 m to the driver's eyes and a minimum width "c" of 0.75 m. In the example illustrated, visual field 40 forms part of visual field 38.

The occurrence of a double image in the overlap-zone 39, in the rear-view mirror arrangement shown in Fig. 4, is unfavourable. Such a double image requires increased attentiveness on the part of the driver when he is using the mirror and involves the danger that he will be misled or confused.

Fig. 5 shows another rear-view mirror arrangement known in the art, with a generally-known convex mirror 53; the parts corresponding to those in Fig. 4 are given the same reference numbers. As can immediately be seen in Fig. 5, visual field 38 is the same size as with the angle-mirror 33 in Fig. 4; however, the second visual field 37 is absent. The legally required visual field 40 is again shown with cross-hatching in Fig. 5, and it can be seen that there is no real possibility of seeing [much] beyond the legally required visual field.

Fig. 6 shows another known rear-view mirror arrangement with a mirror 43 which is attached to the outside of the vehicle and whose angular position can be adjusted from inside the vehicle 31 by means of a Bowden cable. When the

mirror 43 is set in its normal position, the visual field 38 bounded by broken lines is visible, which again is somewhat larger than the legally required visual field 40 on the right-hand side. When the mirror 43 is suitably swivelled, visual field 37, marked with dot-and-dash lines and lying outside visual field 38, is visible. However, the disadvantage here is that when the mirror 43 is swivelled to visual field 37, visual field 38 is lost.

Fig. 7 shows a known rear-view mirror arrangement in which, for viewing on the right-hand side, there is provided, in addition to the usual convex mirror 53 of width "b", a second mirror (not shown in Fig. 7), arranged below the convex mirror 53. Although the second mirror is not illustrated, Fig. [7] shows the effect achievable therewith: the normal visual field 38, which is marked with broken border-lines and which includes the legally required, cross-hatched visual field 40 is viewable with mirror 53; whereas visual field 41, which is marked with dot-and-dash hatching and is in front of visual field 38, can be seen by means of the second mirror. Visual field 41 is only in the front region of the right-hand side of the vehicle, i.e. right next to the front part of the vehicle, and only goes a short distance rearward, with the result that an overtaking vehicle approaching rapidly from behind cannot be detected in good time.

Fig. 8 illustrates the visual field relationships with the rear-view mirror arrangement according to the invention, and shows [the effect of] various settings of the auxiliary mirror 3. The individual settings of the auxiliary mirror 3 (of Fig. 1) are surrounded by different types of lines: a *first* setting is shown with continuous lines, a *second* setting is shown with dot-and-dash lines, a *third* setting is shown with a long and two short dashes, a *fourth* setting

is shown with two dots and a dash, a *fifth* setting is shown by dots, and a *sixth* is shown by short dashes.

As can be seen by comparing Fig. 8 with the fields of vision shown in Figs. 4 to 7, the rear-view mirror arrangement 1 of the invention makes possible, with the first setting, the same visual field pattern as is given by the second mirror in Fig. 7, i.e. a visual field 38 that is present with all mirror settings, and an additional visual field 42. The additional visual field 42 can be shifted to visual field 44, more to the right of the vehicle 31, this being the second setting. Thereby, the rear-view mirror arrangement 1 gives a wider possible view than does the arrangement with a second mirror according to Fig. 7. With the third and fourth settings of the auxiliary mirror 3 (Fig. 1), it is possible, in addition to visual field 38 viewable by means of the main mirror 2, to see further visual fields 45 and 46 respectively, located further back, and covering a considerably wider area; in this way, with the rear-view mirror arrangement 1, it is possible to set a very large visual field area behind or next to and parallel to the vehicle 31, whereby all other vehicles approaching the vehicle on the right can be detected in good time. With the fifth setting of the auxiliary mirror 3 (Fig. 1), providing visual field 47, the driver can view not only visual field 42 running from the front edge of the vehicle 31 – as in the first setting – but also an area going further back and wider outwards to the right. With the sixth setting of the auxiliary mirror 3 (Fig. 1), a visual field 48 can be viewed that includes the region around the right-hand front edge of the vehicle 31. This setting is particularly beneficial when it is necessary to drive in unroaded terrain, or when passengers are alighting and there are children or objects in front of the vehicle, and a special check needs to be made of this front, right-hand region near the vehicle 31.

Walter Jackisch, B.Eng.
Patent Attorney
Stuttgart

Reitter & Schefenacker KG
Kreuzstrasse 55-59
7300 Esslingen

A 34 879

25 Aug. 1975

The claims defining the invention are as follows:

1. A rear-view mirror arrangement for vehicles, particularly motor vehicles, with a main mirror for a field of vision from infinity to a blind angular region ending at a certain distance rearward of the main mirror, and with a size-reducing auxiliary mirror, arranged below the main mirror, for a field of vision located at least inside the blind angular region; with the reflecting-area of the main mirror being larger than that of the auxiliary mirror, characterized in that the auxiliary mirror (3) is adjustable from inside the vehicle (31) by means of an adjusting device (12, 13).

2. A rear-view mirror arrangement as claimed in claim 1, characterized in that the main mirror (2) and the auxiliary mirror (3) are mounted in a common mirror-housing [4].

3. A rear-view mirror arrangement as claimed in claim 2, characterized in that the mirror-housing (4) has an outer housing-shell (5) and an inner housing-shell (6), the two housing shells (5, 6) being connected to each other at their outer edges (7, 8), and running at a distance from each other in the region between said outer edges (7, 8), thus forming a hollow space.

4. A rear-view mirror arrangement as claimed in claim 3, characterized in that the outer edges (7, 8) of the housing shells (5, 6) are adhesively-bonded or welded together, or one of such edges (7, 8) is snapped into the other.

5. A rear-view mirror arrangement as claimed in claim 3 or 4, characterized in that the mutually connected outer edges (7, 8) of the outer and inner shells (5, 6) are provided with a impact protection frame (23) running round them.

6. A rear-view mirror arrangement as claimed in claim 3, 4, or 5, characterized in that the hollow space is filled with expandable plastic, e.g. polyurethane.

7. A rear-view mirror arrangement as claimed in any of claims 2 to 6, characterized in that there are essentially-vertical ribs (24, 25) formed on the outside of the outer housing-shell (5).

8. A rear-view mirror arrangement as claimed in claim 7, characterized in that the ribs (24, 25) increase in height in the direction toward the lower edge of the mirror-housing (4).

9. A rear-view mirror arrangement as claimed in any of claims 2 to 8, characterized in that the inner housing-shell (6) is designed with a first surface region, which is adjacent to the main mirror (2) and essentially parallel to the rear of the main mirror (2).

10. A rear-view mirror arrangement as claimed in claim 9, characterized in that the main mirror (2) is adhesively bonded to the first surface region of the inner housing-shell (6).

11. A rear-view mirror arrangement as claimed in any of claims 2 to 10, characterized in that: the inner housing-

shell (6) has a second surface region, which is located below the first surface region and which is trough-shaped; and the auxiliary mirror (3) is mounted within said trough-shaped recess (11), at a distance from the back (14) of the recess (11).

12. A rear-view mirror arrangement as claimed in claim 11, characterized in that the adjusting device (12, 13) for the auxiliary mirror (3) is fastened in the region between the back (14) of the recess (11) and the part (15) of the outer housing-shell (5) opposite thereto.

13. A rear-view mirror arrangement as claimed in any of claims 1 to 12, characterized in that the adjusting device (12, 13) has at least one electric motor, which is frictionally connected, by way of a positioning-mechanism (12), to the auxiliary mirror (3), and to which control-signals can be sent along a connecting-cable (16) running to the vehicle (31).

09/890619
5. Aug. 1975
2537876

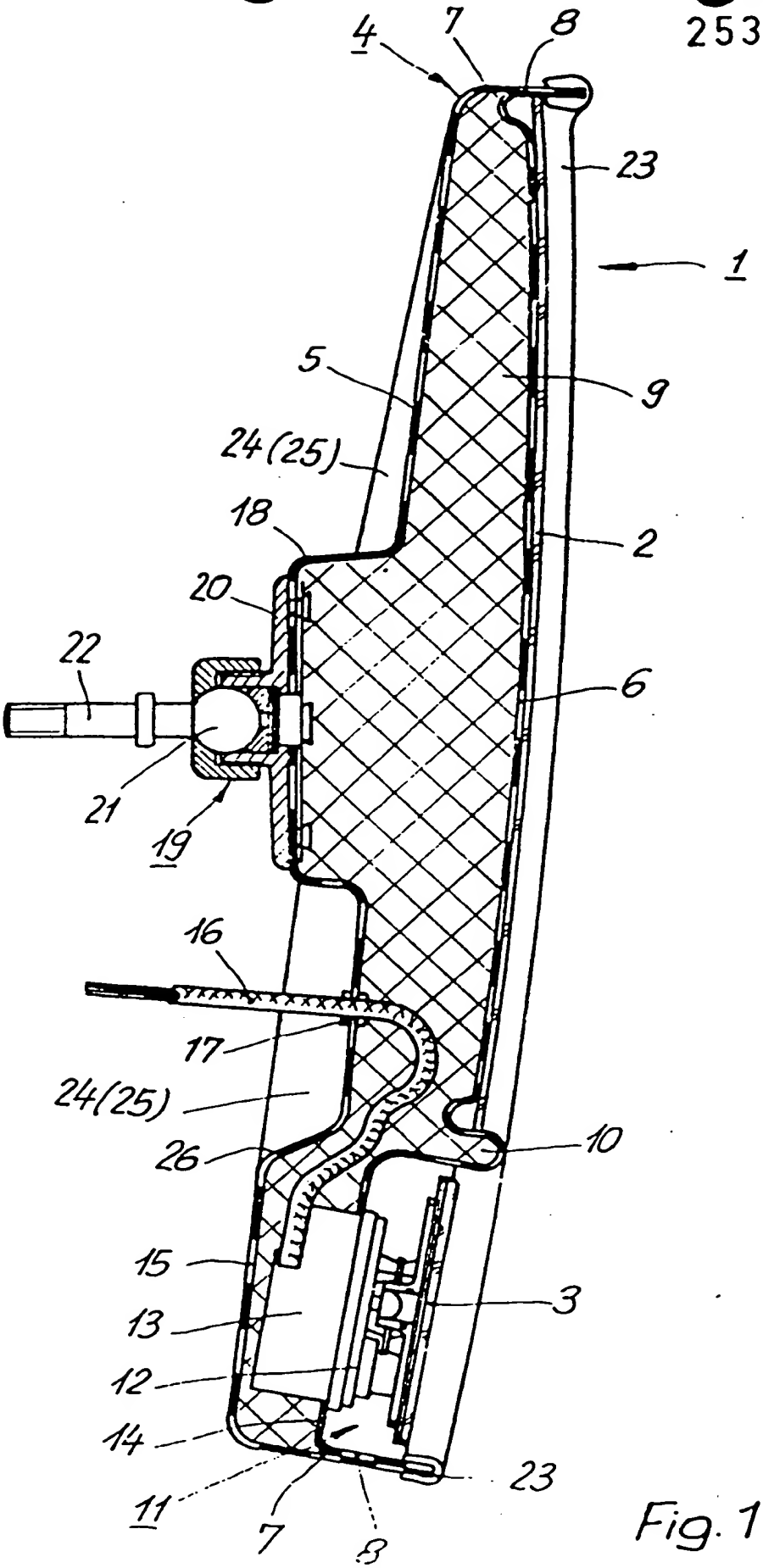

Fig. 1

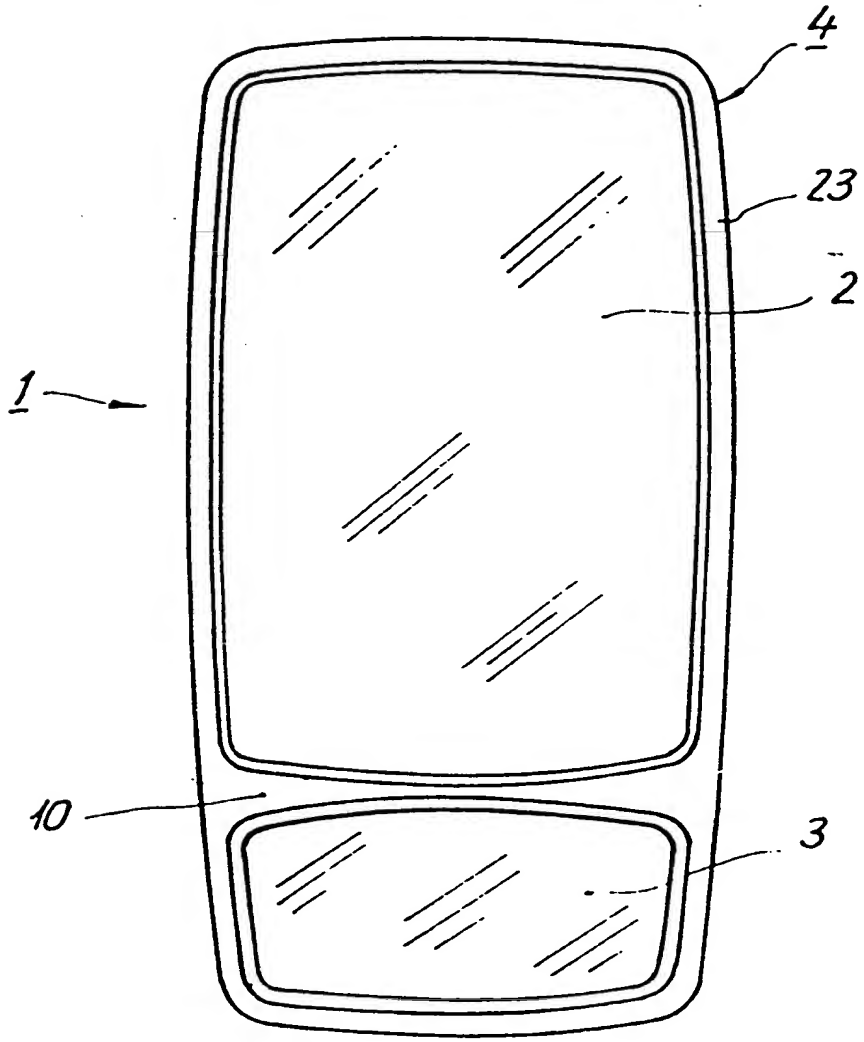

Fig. 2

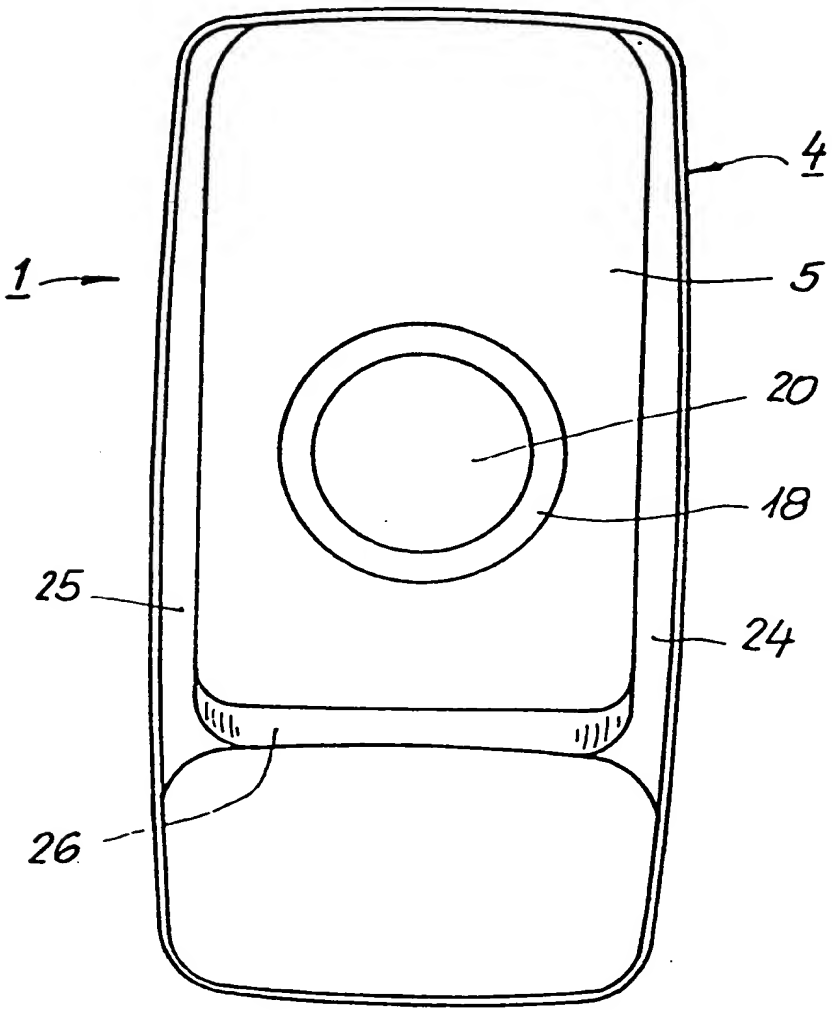

Fig. 3

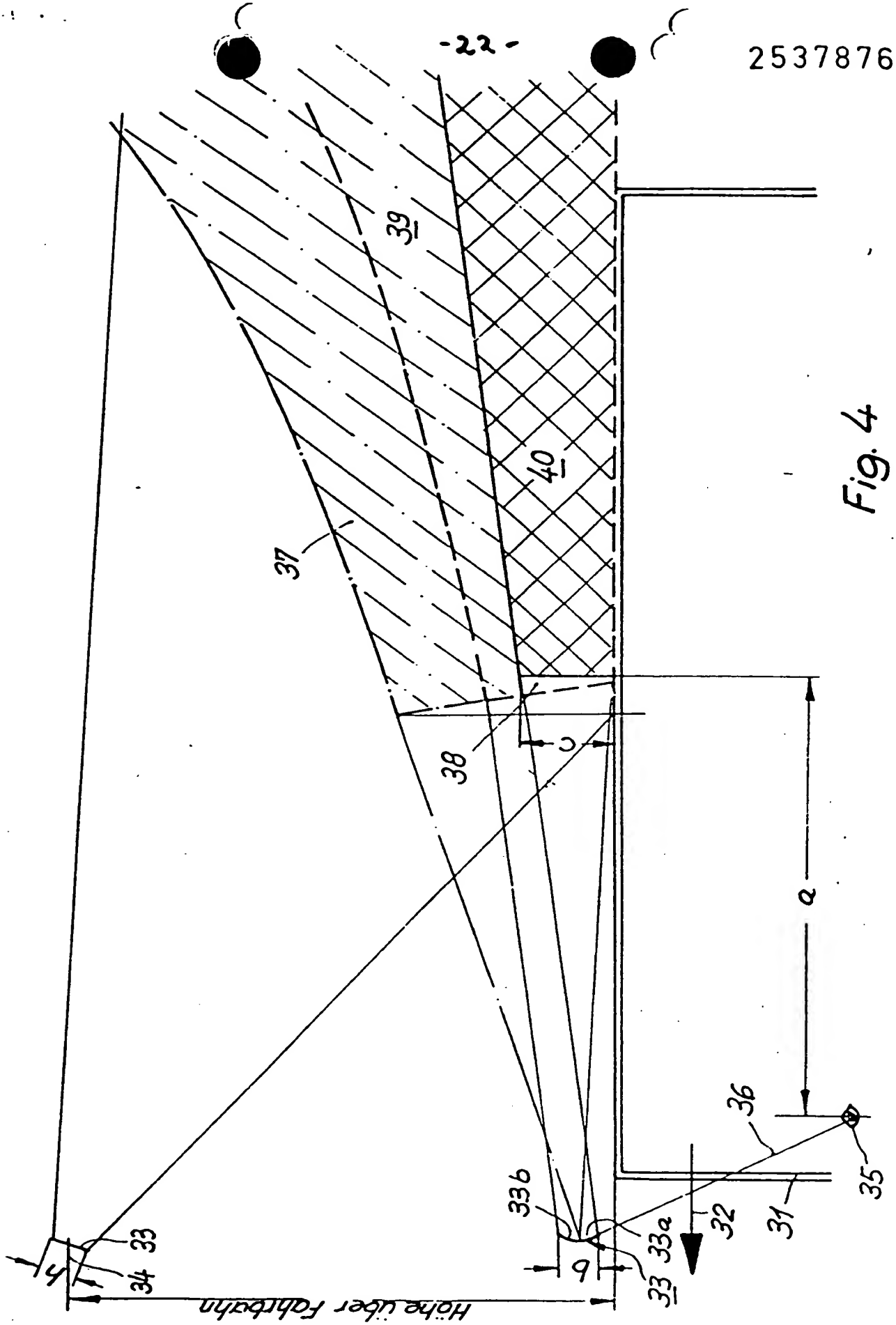

Fig. 4

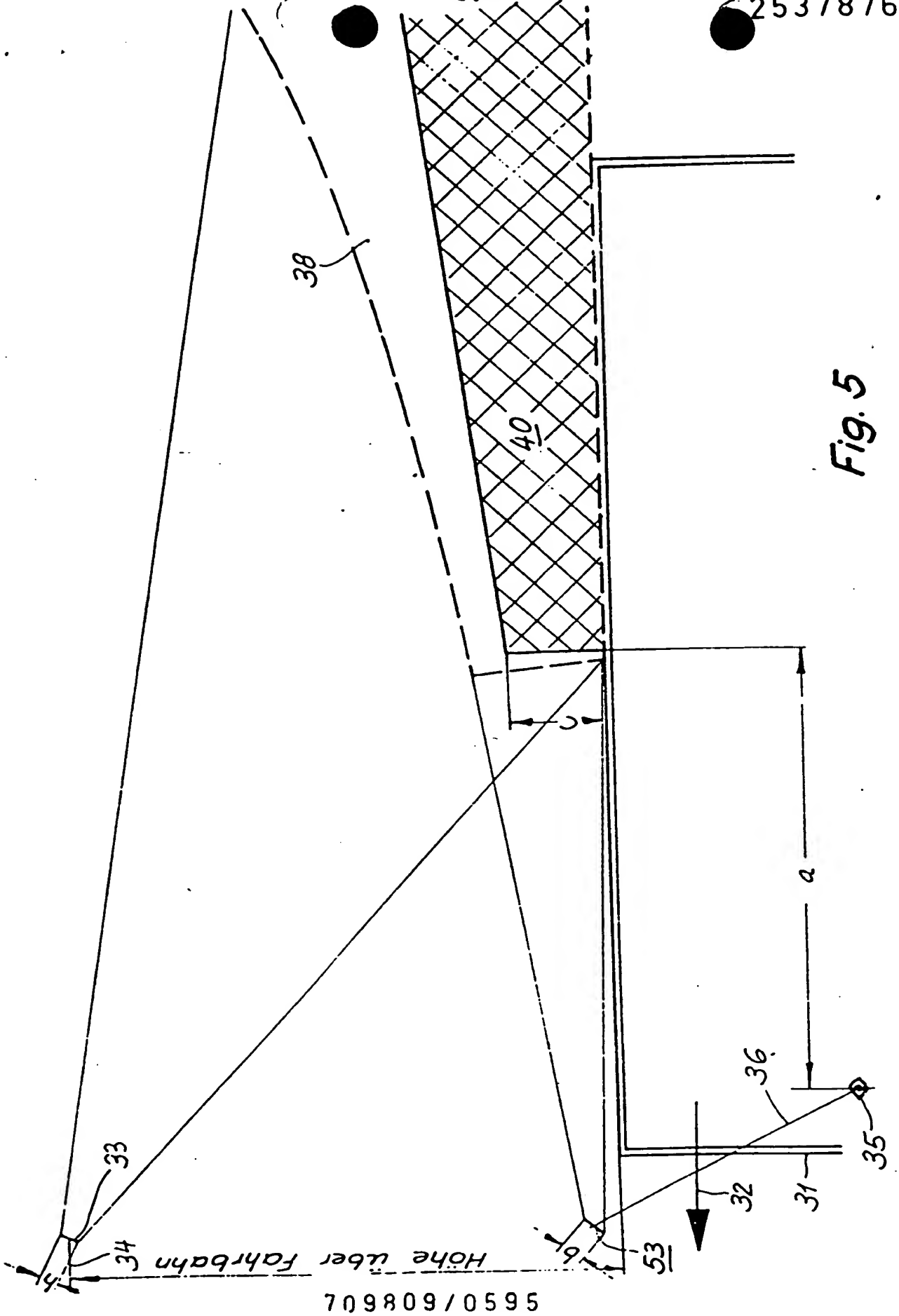

Fig. 5

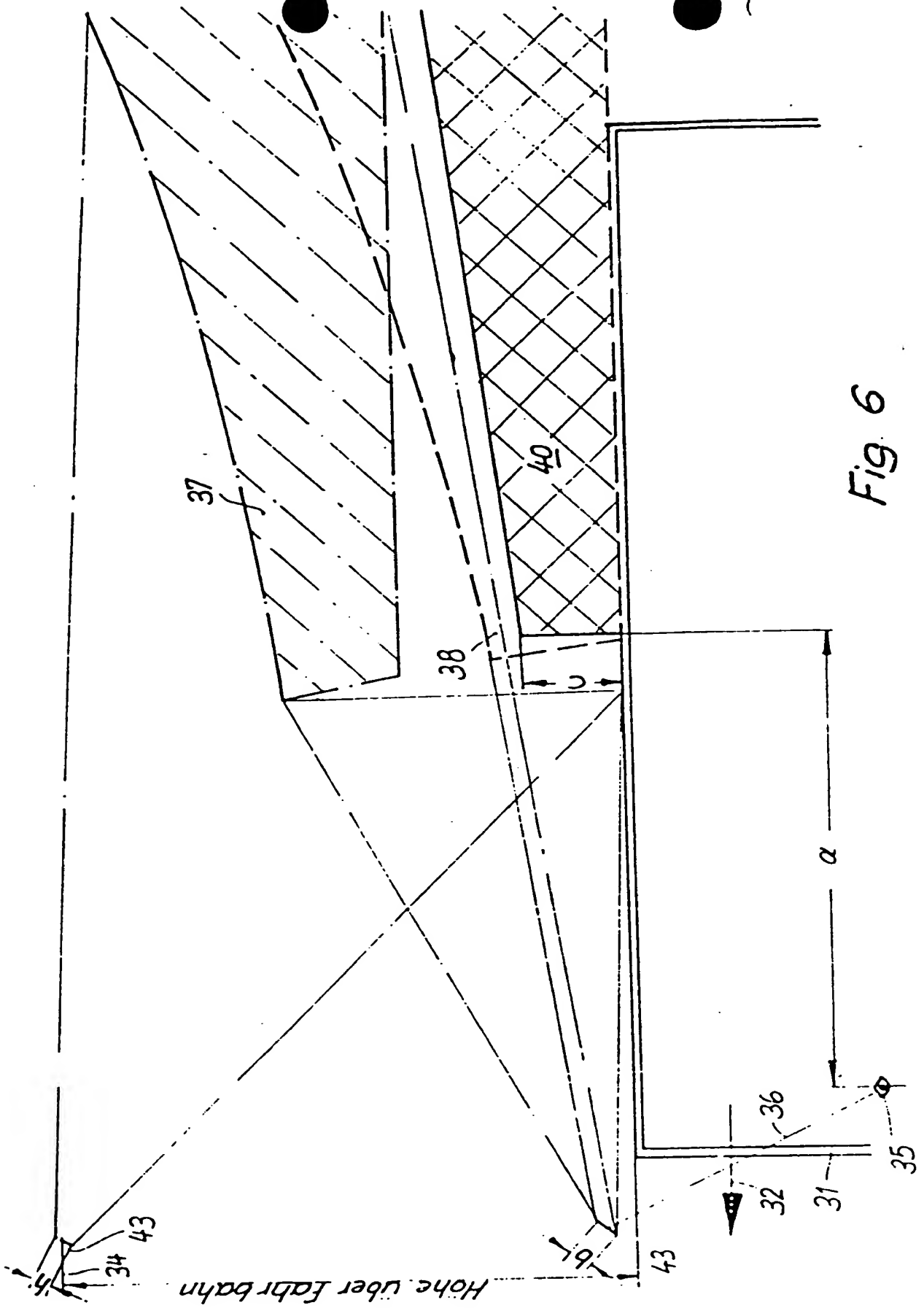

Fig. 6

2537876
09/890619

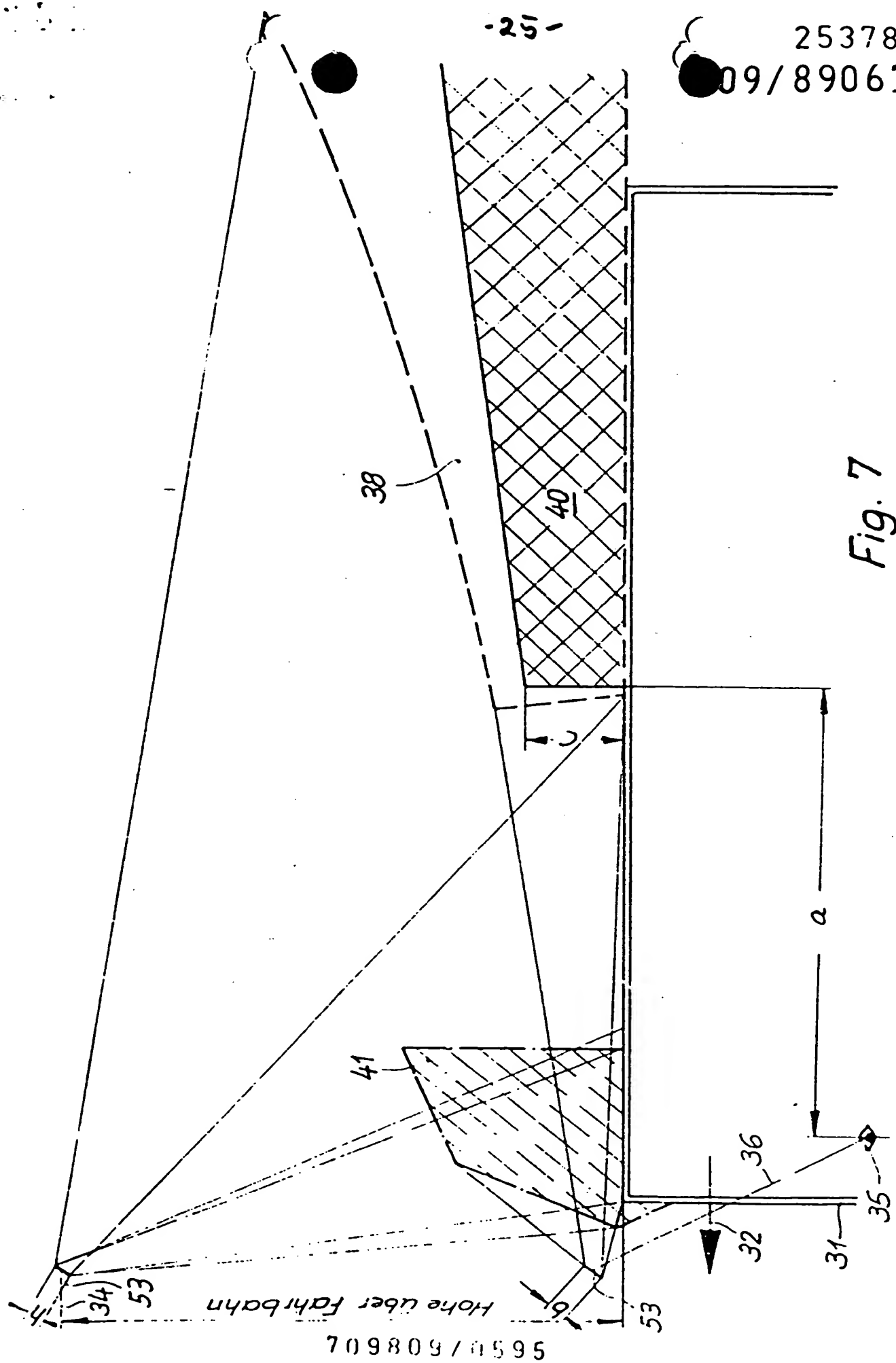

Fig. 7

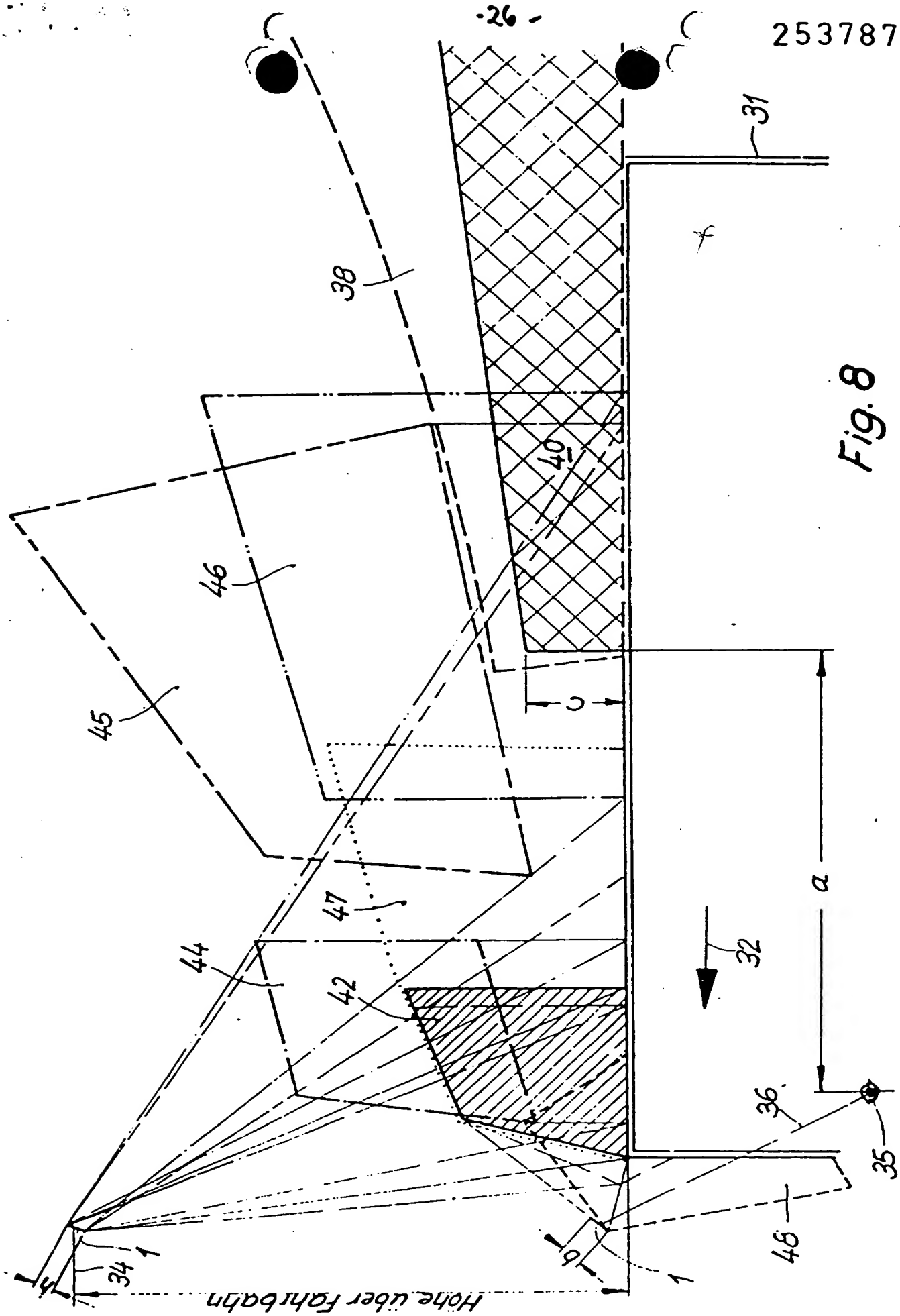

Fig. 8